

We Claim:

1. A system for performing processing operations on a closed loop fluid system, comprising:

5 a service connection valve adapted to be connected to the closed loop fluid system, the service connection valve including a valve seat adapted to be fixed to the closed loop fluid system and a valve core that is adapted to be removably connectable to said valve seat, and said valve seat includes an exterior surface portion that is adapted to permit connection with a latching connector; and

10 a service tool that is connectable with said valve seat, said service tool including:

a) a latching connector that is engageable with said exterior surface portion for connecting said service tool to said valve seat;

b) a removal/insertion mechanism that is capable of engaging said valve core so as to permit removal of said valve core from, or
15 insertion of said valve core into, said valve seat; and

c) a port through which fluid flow can occur.

2. A system according to claim 1, wherein said valve core comprises a valve body adapted to be detachably connected to said valve seat, and a valve assembly
20 connected to said valve body.

3. A system according to claim 2, wherein said valve assembly is detachably connected to said valve body.

25 4. A system according to claim 1, wherein said valve seat comprises a one-piece body, and said valve core comprises a valve assembly adapted to be detachably connected to said one-piece body.

5. A system according to claim 1, wherein said latching connector comprises a latching ball connector.

6. A system according to claim 1, wherein said exterior surface portion
5 comprises a detent groove.

7. A system according to claim 1, wherein said exterior surface portion comprises threads.

8. A system according to claim 1, wherein said valve seat comprises a hex head, and said latching connector comprises a generally hollow body with an open end having a hex that is engageable with said hex head.

9. A system according to claim 8, wherein said valve core includes a hex
15 head, and said removal/insertion mechanism includes a drive hex that is engageable with said hex head on said valve core.

10. A system according to claim 1, wherein said service tool further includes a valve for controlling fluid flow therethrough.
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11. A system according to claim 1, wherein said removal/insertion mechanism includes a split collet assembly for gripping said valve core.

12. A service tool for connecting to a valve seat and removing/inserting a
25 valve core from/into the valve seat, comprising:
a generally hollow body having an open end, a closed end, and a port positioned between the open and closed ends;
a latching connector connected to said body adjacent the open end thereof to releasably connect said body to the valve seat; and

a removal/insertion mechanism disposed within said body, said removal/insertion mechanism being movable within said hollow body along a longitudinal axis of said body between a first position adjacent the open end and a second position adjacent the closed end of said body.

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13. A service tool according to claim 12, wherein said removal/insertion mechanism comprises a socket that is designed to hold and retain said valve core, and said socket prevents fluid communication between the open end and said port when in said first position and permits fluid communication between the open end and said port when in said second position.

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14. A service tool according to claim 13, further including a shaft connected to said socket, said shaft is oriented parallel to the longitudinal axis and extends through the closed end of said body to the exterior thereof.

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15. A service tool according to claim 13, further including a valve mounted in said body between the open end and said port, said valve is mounted for movement between a first position which prevents fluid communication between the open end and said port and a second position which permits fluid communication between the open end and said port.

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16. A service tool according to claim 15, wherein said valve includes a passage therethrough that is sized to permit passage of said socket therethrough when said valve is at the first position.

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17. A service tool according to claim 12, wherein said latching connector comprises a latching ball connector.

18. A service tool according to claim 12, wherein said open end of said body has a hex.

19. A service tool according to claim 18, wherein said removal/insertion mechanism includes a drive hex.

20. A service tool according to claim 13, wherein said socket includes a split collet assembly disposed therein.

21. A service tool for connecting to a valve seat and removing/inserting a valve core from/into the valve seat, comprising:
a generally hollow body having an open end, a closed end, and a port positioned between the open and closed ends;
a connector connected to said body adjacent the open end thereof to connect said body to the valve seat; and
a removal/insertion mechanism disposed within said body, said removal/insertion mechanism being movable within said hollow body along a longitudinal axis of said body between a first position adjacent the open end and a second position adjacent the closed end of said body, said removal/insertion mechanism including a split collet assembly for gripping the valve core.

22. A service tool according to claim 21, wherein said open end of said body has a hex.

23. A service tool according to claim 22, wherein said removal/insertion mechanism further includes a drive hex.

24. A service tool for connecting to a valve seat and removing/inserting a valve core from/into the valve seat, comprising:

a generally hollow body having an open end, a closed end, and a port positioned between the open and closed ends, said open end of said body having a hex;

a connector connected to said body adjacent the open end thereof to connect said body to the valve seat; and

5 a removal/insertion mechanism disposed within said body, said removal/insertion mechanism being movable within said hollow body along a longitudinal axis of said body between a first position adjacent the open end and a second position adjacent the closed end of said body, and said removal/insertion mechanism further includes a drive hex.

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25. A method of performing processing operations on a closed loop fluid system, comprising:

attaching a service connection valve to the closed loop fluid system, the service connection valve including a valve seat fixed to the closed loop fluid system and a valve
15 core that is removably connected to said valve seat, and said valve seat includes an exterior surface portion that is adapted to permit connection with a latching connector;

latching a service tool to said valve seat using a latching connector, said service tool including a removal/insertion mechanism that is capable of engaging said valve
core so as to permit removal of said valve core from, or insertion of said valve core into,
20 said valve seat;

removing said valve core from said valve seat using said removal/insertion mechanism of said service tool; and

performing a processing operation on the closed loop fluid system through said valve seat.

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26. A method according to claim 25, wherein said service tool further includes a valve that is mounted for movement between a first position where flow through said tool is prevented and a second position where flow through said tool is permitted, and wherein removing said valve core occurs when said valve is in the first

position and the processing operation is performed when said valve is in the second position.

27. A method according to claim 25, further including inserting said valve
5 core back into said valve seat using said service tool after charging or evacuating.

28. A coupling for conducting servicing operations through a valve seat,
comprising:

10 a body having first and second open ends and a flow path extending through said
body between the first and second ends;

a latching connector associated with the first open end of said body to latch said
body to the valve seat; and

15 a valve core associated with the second open end of said body controlling flow
through said second open end, said valve core includes a portion thereof that projects
beyond the second open end, and the portion of said valve core that projects beyond the
second open end includes an exterior surface with a detent groove and threads adjacent
the detent groove.

20 29. A coupling according to claim 28, wherein said valve core is detachably
connected to said body within the second open end thereof, and the portion of said valve
core that projects beyond the second open end further includes a hex head on the
exterior surface adjacent the detent groove.

25 30. A tool attachable to a pneumatic gun for inserting or removing a valve
core into or from a valve seat, comprising:

a holding head with a first end adapted to connect to a housing of the pneumatic
gun and a second end formed with an internal hex; and

a drive head disposed within said holding head, said drive head including a first end adapted for connection to a drive element of the pneumatic gun and a second end provided with a socket for driving the valve core.

5 31. A tool according to claim 30, wherein said internal hex is sized to engage a hex surface on the valve seat, and the socket is provided with an internal hex that is sized to engage a hex surface on the valve core.

10 32. A tool according to claim 30, wherein said internal hex is sized to engage a hex surface on a second tool that connects to the valve seat, and the socket is adapted to drive a portion of the second tool that holds and retains the valve core.

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